4.2 AIR QUALITY

This section includes a summary of applicable regulations, existing air quality conditions, and an analysis of potential short-term and long-term air quality impacts of the project. The method of analysis for short-term construction, long-term regional (operational), local mobile source, toxic and odorous air emissions is consistent with the recommendations of the Bay Area Air Quality Management District (BAAQMD), as presented in the BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans (BAAQMD 1999). In addition, mitigation measures are recommended, as necessary, to reduce potentially significant adverse air quality impacts.

4.2.1 EXISTING CONDITIONS

The project site is located in Marin County, which is under the jurisdiction of BAAQMD. BAAQMD is the primary local agency with respect to air quality for all of Marin County. Marin County is within the San Francisco Bay Area Air Basin (SFBAAB), which also comprises all of Alameda, Contra Costa, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern portion of Sonoma, and the southwestern portion of Solano County. Air quality in this area is determined by such natural factors as topography, meteorology, and climate, in addition to the presence of existing air pollution sources and ambient conditions. These factors along with applicable regulations are discussed below.

CLIMATE, METEOROLOGY, AND TOPOGRAPHY

The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Coast Range splits resulting in a western coast gap, Golden Gate, and an eastern coast gap, Carquinez Strait, which allow air to flow in and out of the SFBAAB and the Central Valley.

The climate is dominated by the strength and location of a semi-permanent, subtropical high-pressure cell. During the summer, the Pacific high pressure cell is centered over the northeastern Pacific Ocean resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below to the surface because of the northwesterly flow produces a band of cold water off the California coast. Thus, the cool and moisture-laden air approaching the coast from the Pacific Ocean is further cooled by the presence of the cold water band resulting in condensation and the presence of fog and stratus clouds along the Northern California coast.

In the winter, the Pacific high-pressure cell weakens and shifts southward resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms. Weak inversions coupled with moderate winds result in a low air pollution potential.

Local meteorology of the project area is represented by measurements recorded at the San Rafael station. The normal annual precipitation, which occurs primarily from November through March, is approximately 35 inches. January temperatures range from a normal minimum of 41°F to a normal maximum of 57°F. July temperatures range from a normal minimum of 54°F to a normal maximum of 81°F (National Oceanic and Atmospheric Administration 1992). The annual predominant wind direction and speed is from the northwest at approximately 20 mph (ARB 1994).

AIR POLLUTION POTENTIAL

Air pollution potential is influenced by wind circulation, inversions, stability, solar radiation, and sheltered terrain. For instance, low wind speeds result in restricted movement of air pollution, thus leading to potentially unhealthy levels of air pollution concentrations. Low wind speeds occur most frequently in the fall, winter, early morning, and at night.

A temperature inversion is a layer of warmer air over a layer of cooler air. Inversions influence the mixing depth of the atmosphere, which is the vertical depth available for diluting air pollution near the ground, thus significantly affecting air quality conditions. The SFBAAB experiences two types of inversions. Summer and fall inversions are a result of subsiding air from the subtropical high-pressure zone and from the cool marine layer that is drawn into the area by the heated low-pressure zone in the Central Valley. Winter inversions, also termed radiation inversions, are formed as heat quickly radiates from the earth's surface after sunset cooling the layer of air at the surface. Radiation inversions are strongest on clear, low-wind, cold winter nights, which allow the build-up of carbon monoxide and particulate matter.

Stability describes the resistance of the atmosphere to vertical motions. The stability of the atmosphere is dependent upon the vertical distribution of temperature with height. When the temperature decreases vertically at 10°C per 1,000 meters, the atmosphere is "neutral." When the lapse rate is greater than 10°C per 1,000 meters, the atmosphere is "unstable." When the lapse rate is less than 10°C per 1,000 meters, the atmosphere is "stable." Stability categories range from "Extremely Unstable" (Class A), through "Neutral" (Class D), to "Stable" (Class F). Unstable conditions occur during daytime hours when solar heating warms the lower atmospheric layers sufficiently. Under A stability conditions, large horizontal wind direction fluctuations occur coupled with large vertical mixing depths. Under B stability conditions, wind direction fluctuations and the vertical mixing depth are less pronounced because of a decrease in the amount of solar heating. Under C stability conditions, solar heating is weak along with horizontal and vertical fluctuations because of a combination of thermal and mechanical turbulence. Under D stability conditions, vertical motions are primarily generated by mechanical turbulence. Under E and F stability conditions, air pollution emitted into the atmosphere will travel downwind with poor dispersion.

The frequency of hot, sunny days during the summer months in the area is another important factor that affects air pollution potential. In the presence of solar radiation, reactive organic gases (ROG) and oxides of nitrogen (NO_X) form to produce ozone.

EXISTING AMBIENT AIR QUALITY

The California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (EPA) currently focus on the following air pollutants as indicators of ambient air quality: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, they are commonly referred to as "criteria air pollutants." State and federal air quality standards and designations are provided in Table 4.2-1.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Because sunlight and heat serve as catalysts for the reactions between ozone precursors, peak ozone concentrations typically occur during the summer in the Northern Hemisphere (EPA 2007a). In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 1991).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 to 0.40 ppm for 1 to 2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary

Table 4.2-1
Ambient Air Quality Standards and Designations for Marin County

Pollutant	Averaging Time	California		National Standards[1]		
		Standards[2, 3]	Attainment Status[4,6]	Primary[3,5]	Secondary[3,6]	Attainment Status[7]
Ozone	1-hour	0.09 ppm (180 $\mu g/m^3$)	N (Serious)	–[9]	Same as Primary Standard	–[9]
	8-hour	0.070 ppm[8] (137 $\mu g/m^3$)	–	0.08 ppm (157 $\mu g/m^3$)		N
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 $\mu g/m^3$)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 $\mu g/m^3$)		
Nitrogen Dioxide (NO_2)	annual arithmetic mean	0.030 ppm (56 $\mu g/m^3$)	–	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (338 $\mu g/m^3$)	A	–		–
Sulfur Dioxide (SO_2)	annual arithmetic mean	–	–	0.030 ppm (80 $\mu g/m^3$)	–	A
	24-hour	0.04 ppm (105 $\mu g/m^3$)	A	0.14 ppm (365 $\mu g/m^3$)	–	
	3-hour	–	–	–	0.5 ppm (1300 $\mu g/m^3$)	
	1-hour	0.25 ppm (655 $\mu g/m^3$)	A	–	–	–
Respirable Particulate Matter (PM_{10})	annual arithmetic mean	20 $\mu g/m^3$	N	–[i]	Same as Primary Standard	U
	24-hour	50 $\mu g/m^3$		150 $\mu g/m^3$		
Fine Particulate Matter ($PM_{2.5}$)	annual arithmetic mean	12 $\mu g/m^3$	N	15 $\mu g/m^3$	Same as Primary Standard	U
	24-hour	–	–	35 $\mu g/m^3$		
Lead[10]	30-day average	1.5 $\mu g/m^3$	A	–	–	–
	calendar quarter	–	–	1.5 $\mu g/m^3$	Same as Primary Standard	–
Sulfates	24-hour	25 $\mu g/m^3$	A	**No National Standards**		
Hydrogen Sulfide	1-hour	0.03 ppm (42 $\mu g/m^3$)	U			
Vinyl Chloride[10]	24-hour	0.01 ppm (26 $\mu g/m^3$)	–			

Table 4.2-1
Ambient Air Quality Standards and Designations for Marin County

Pollutant	Averaging Time	California		National Standards[1]		
		Standards[2, 3]	Attainment Status[4,6]	Primary[3,5]	Secondary[3,6]	Attainment Status[7]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

[1] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[2] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[8] This concentration was approved by the California Air Resources Board (ARB) on April 28, 2005, and became effective May 17, 2006.

[9] The 1-hour ozone NAAQS was revoked on June 15, 2005 and the annual PM_{10} NAAQS was revoked in 2006.

[10] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for this pollutant.

Sources: ARB 2007b, EPA 2007b

resistance, decreasing breathing volumes, and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to symptomatic responses that include such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to the above adverse health effects, evidence also exists relating ozone exposure to an increase in the permeability of respiratory epithelia; such increased permeability leads to an increase in responsiveness of the respiratory system to challenges, and the interference or inhibition of the immune system's ability to defend against infection (Godish 1991).

With respect to the National Ambient Air Quality Standards (NAAQS), Marin County is currently designated as a nonattainment area for the 8-hour ozone standard, as shown in Table 4.2-1 (ARB 2007b). In addition, Marin County is currently designated as a serious nonattainment area for the state 1-hour ozone standard (ARB 2007b).

As shown in Table 4.2-2, neither the state nor the national ozone standards were exceeded from 2004 to 2006 (See section 4.2.2 Regulatory Background under the Air Quality Plans subheading for further discussion of attainment designations).

Table 4.2-2
Summary of Annual Ambient Air Quality Data (2004–2006)

	2004	**2005**	**2006**
Ozone			
State Standard (1-hr./8-hr. avg., 0.09/0.07 ppm) National Standard (8-hr. avg., 0.08 ppm)			
Maximum Concentration (1-hr./8-hr. avg., ppm)	0.091/ 0.063	0.081/ 0.059	0.089/ 0.058
Number of Days State Standard Exceeded	0	0	0
Number of Days National 1-hr./8-hr. Standard Exceeded	0/0	0/0	0/0
Fine Particulate Matter ($PM_{2.5}$)			
State Standard (annual avg., 12 $\mu g/m^3$) National Standard (annual/24-hr avg., 15/35 $\mu g/m^3$)			
Maximum Concentration (1-hr. avg., ppm)	39.7	43.8	25.4
Number of Days National Standard Exceeded	0	0	0
Respirable Particulate Matter (PM_{10})			
State Standard (annual/24-hr. avg., 20/50 $\mu g/m^3$) National Standard (24-hr. avg., 150 $\mu g/m^3$)			
Maximum Concentration ($\mu g/m^3$, National/California[1])	51.0/52.3	37.1/39.1	19.9/20.2
Number of Days State Standard Exceeded (Measured[2])	1	0	0
Number of Days National Standard Exceeded (Measured/Calculated[1])	0/0	0/0	0/0

Notes:
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter;
Measurements for ozone and PM_{10} were recorded at the San Rafael monitoring station, while measurements for $PM_{2.5}$ were recorded at the Vallejo-304 Tuolumne Street station. Data from both stations are considered representative of air quality at the project site.

1 National and California statistics may differ for the following reasons: the state statistics are based on California approved samplers, whereas national statistics are based on samplers using the federal reference or equivalent methods.

2 Measured days are those days that an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year. The number of days a measurement was greater than the level of the national daily standard. Measurements are collected every day, every 3 days, or every 6 days, depending on the time of year and the site's monitoring schedule. The number of days above the standards is not directly related to the number of violations of the standard for the year.

Sources: ARB 2007a, 2007b, EPA 2007b

According to the 2006 California Almanac of Emissions and Air Quality (ARB 2006), emissions of ozone precursors (ROG and NO_X) have decreased in the SFBAAB since 1975 and are projected to continue declining through 2020. The SFBAAB has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_X and ROG. Stationary source emissions of ROG have declined over the past 20 years because of new controls for oil refinery fugitive emissions and new rules for control of ROG from various industrial coatings and solvent operations.

With respect to ozone air quality trends according to the almanac, peak ozone values in the SFBAAB have declined approximately 26 percent during the last 20 years. Although the long-term trends indicate improving air quality, since 1994 the peak indicators show some elevated values. However, it is not clear whether these data represent a significant change in the overall trend.

Carbon Monoxide

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources of pollution. In fact, 77% of the nationwide CO emissions are from mobile sources. The other 23% consists of CO emissions from wood-burning stoves, incinerators, and industrial sources.

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2007a).

Marin County is currently designated as an attainment and unclassified/attainment area for the state and national CO standards, respectively (Table 4.2-1) (ARB 2007a).

According to the 2006 California Almanac of Emissions and Air Quality (ARB 2006), emissions of CO have been declining in the SFBAAB since 1975. Motor vehicles and other mobile sources are the largest sources of CO emissions in the Basin. Emissions from motor vehicles have been declining, with the introduction of new automotive emission controls, despite increases in vehicle miles traveled (VMT). Oil refineries, manufacturing, and electric generation contribute a significant portion of the stationary source CO emissions. Areawide CO emissions are primarily from residential fuel combustion (including wood), waste burning, and fires.

As in other areas of the State, CO concentrations in the SFBAAB have declined substantially over the last 20 years. With respect to CO air quality trends according to the almanac, the peak 8-hour indicator value during 2004 is 30 percent of what it was during 1985 and is now well below the standards. In fact, neither the State nor the national standards have been exceeded in this area since 1991. Based on emission projections, the area is expected to maintain an attainment status in the coming years.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2007a). The combined emissions of NO and NO_2 are referred to as NO_X, which are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog, the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4–12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has been linked on occasion with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung functions.

Marin County is currently designated as an attainment or unclassified/attainment area for the state and national NO_2 standards, respectively (Table 4.2-1) (ARB 2007a).

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Marin County is currently designated as an attainment and unclassified/attainment area for the state and national SO_2 standards, respectively (Table 4.2-1) (ARB 2007a).

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and reactive organic gases (EPA 2007a). $PM_{2.5}$ includes a subgroup of finer particles that have an aerodynamic diameter of 2.5 micrometers or less (ARB 2007a).

The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons, and other toxic substances adsorbed onto fine particulate matter, which is referred to as the piggybacking effect, or with fine dust particles of silica or asbestos. Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated PM_{10} concentrations and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2007a). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and contain substances that are particularly harmful to human health.

Marin County is currently designated as a nonattainment area for the state PM_{10} standard and as an unclassified area for the national standard (Table 4.2-1) (ARB 2007a). With respect to $PM_{2.5}$, Marin County is proposed to be designated as a nonattainment area for the state standard and recommended unclassified for the national standard.

As shown in Table 4.2-2, the national PM_{10} standard was not exceeded from 2004 to 2006; however, the state standard was exceeded once during this period (2004).

According to the 2006 California Almanac of Emissions and Air Quality (ARB 2006), direct emissions of PM_{10} increased in the SFBAAB between 1975 and 2005 and are projected to continue increasing through 2020. This increase is due to growth in emissions from areawide sources, primarily fugitive dust sources. Emissions of directly emitted PM_{10} from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing, because of adoption of more stringent emission standards.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, as discussed in detail below, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the EPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2007a).

As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (95% between 1980 and 1999), and levels of lead in the air decreased by 94% between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13% of lead emissions. A recent National Health and Nutrition Examination Survey reported a 78% decrease in the levels of lead in people's blood between 1976 and 1991. This dramatic decline can be attributed to the move from leaded to unleaded gasoline (as well as the removal of lead from soldered cans) (EPA 2007a).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story. As stated above, the rapid decrease in lead concentrations can be attributed primarily to phasing out the lead in gasoline. This phase-out began during the 1970s, and subsequent ARB regulations have virtually eliminated all lead from gasoline now sold in California. All areas of the state are currently designated as attainment for the state lead standard (the EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, the CARB identified lead as a toxic air contaminant (TAC) (ARB 2003).

EXISTING AIR QUALITY—GREENHOUSE GASES AND GLOBAL CLIMATE CHANGE

Various gases in the earth's atmosphere, classified as atmospheric greenhouse gases (GHGs), play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back toward space. The earth emits this radiation, which was initially absorbed, back to space, but the properties of the radiation have changed from high-frequency solar radiation lower frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate on Earth. Without the Greenhouse Effect, Earth would not be able to support life as we know it.

Prominent GHGs contributing to the Greenhouse Effect are carbon dioxide (CO_2), methane (CH_4), ozone, nitrous oxide, hydrofluorocarbons, chlorofluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the Greenhouse Effect and have led to a trend of unnatural warming of the earth's climate, known as global climate change or global warming (Ahrens 2003). Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (CEC 2006a). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (CEC 2006a). Emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) associated with agricultural practices and landfills. CO_2 sinks, or reservoirs, include sequestration by vegetation or dissolution into the ocean, among other processes.

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern, respectively. California is the 12th to 16th largest emitter of CO_2 in the world (CEC 2006a). California produced 492 million gross metric tons of carbon dioxide equivalent in 2004 (CEC 2006a). Carbon dioxide equivalent is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the Greenhouse Effect. This potential, known as the global warming potential of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry (2006), 1 ton of CH_4 has the same contribution to the Greenhouse Effect as approximately 21 tons of CO_2. Therefore, CH_4 is a much more potent GHG than CO_2. Expressing emissions in carbon dioxide equivalent takes the contributions of all GHG emissions to the Greenhouse Effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 40.7% of total GHG emissions in the state (CEC 2006a). This sector was followed by the electric power sector (including both in-state and out-of-state sources) (22.2%) and the industrial sector (20.5%) (CEC 2006a).

According to the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). Resource areas other than air quality and atmospheric temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global average temperature is expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state. According to the California Energy Commission (2006b), the snowpack portion of the water supply could potentially decline by 30–90% by the end of the 21st century. A study cited in a report by the California Department of Water Resources projects that approximately 50% of the statewide snowpack will be lost by the end of the century (Knowles and Cayan 2002). Although current forecasts are uncertain, it is evident that this phenomenon could lead to significant challenges in securing an adequate water supply for a growing population. An increase in precipitation falling as rain rather than snow could also lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events. This scenario would place more pressure on California's levee/flood control system (DWR 2006). This issue may be as great of concern in Marin County as it is in other areas of California, as the County relies on local sources of water that originate as rainfall in the coastal areas, and does not rely on a snowpack.

Another outcome of global climate change is sea level rise. Sea level rose approximately 7 inches during the last century (CEC 2006b), and it is predicted to rise an additional 7–22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion (especially a concern in the low-lying Sacramento–San Joaquin River Delta, where pumps delivering potable water could be threatened), and disruption of wetlands (CEC 2006b). As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available. Sea level rise would be a potential concern in the SQSP project area, which is located along the coast. However, SQSP is almost entirely more than 10 feet above sea level and the area where Building 22 (the project site) is located is more than 30 feet above sea level.

4.2.2 REGULATORY BACKGROUND

Air quality with respect to criteria and toxic air pollutants/contaminants within Marin County are regulated by such agencies as BAAQMD, ARB, and EPA. Each of these agencies develops rules, regulations, policies, and/or goals to attain the goals or directives imposed through legislation. Although the EPA regulations may not be superseded, both state and local regulations may be more stringent.

CRITERIA AIR POLLUTANTS

Federal Air Quality Regulations

At the federal level, EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1963. The CAA was amended in 1970, 1977, and 1990.

The CAA required EPA to establish primary and secondary NAAQS, as previously discussed (Table 4.2-1). The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA has responsibility to review all state SIPs to determine conformation to the mandates of the CAAA and determine if implementation will achieve air quality goals. If the EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

State Air Quality Regulations

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA), which was adopted in 1988. The CCAA requires that all air districts in the state endeavor to achieve and maintain the California ambient air quality standards (CAAQS) by the earliest practical date. The act specifies that districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

ARB is primarily responsible for developing and implementing air pollution control plans to achieve and maintain the NAAQS. The ARB is primarily responsibility for statewide pollution sources and produces a major part of the SIP. However, local air districts are still relied upon to provide additional strategies for sources under their jurisdiction. The ARB combines this data and submits the completed SIP to EPA.

Other ARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by air pollution control and air quality management districts), establishing CAAQS (which in many cases are more stringent than the NAAQS), determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, and off-road vehicles.

Local Air Quality Regulations

Bay Area Air Quality Management District

BAAQMD attains and maintains air quality conditions in Marin County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues.

The clean air strategy of BAAQMD includes the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. BAAQMD also inspects stationary sources of air pollution and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA, CAAA, and the CCAA.

In 1999, BAAQMD released the BAAQMD CEQA Guidelines (BAAQMD 1999). This is an advisory document that provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The handbook contains the following applicable components:

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact;
- Specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
- Methods available to mitigate air quality impacts;
- Information for use in air quality assessments and environmental documents that will be updated more frequently such as air quality data, regulatory setting, climate, topography, etc.

Construction activities within Marin County must comply with all applicable BAAQMD rules and regulations, including Regulation 2 (Permits) and Regulation 6 (Particulate Matter and Visible Emissions) (BAAQMD 1999). With respect to lead, BAAQMD has adopted Regulation 11 Rule 1, which includes standards and a manual of procedures.

Air Quality Plans

As stated above, BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. BAAQMD prepares ozone attainment plans (OAP) for the national ozone standard and clean air plans (CAP) for the California standard both in coordination with the Metropolitan Transportation Commission and the Association of Bay Area Governments.

With respect to applicable air quality plans, BAAQMD prepared the *2001 Ozone Attainment Plan* for the national 1-hour ozone standard to address nonattainment of this standard in the SFBAAB. The document included two commitments for further planning: (1) a commitment to conduct a mid-course review of progress toward attaining the national 1-hour ozone standard by December 2003, and (2) a commitment to provide a revised ozone attainment strategy to EPA by April 2004.

In April 2004, the EPA made a final finding that the SFBAAB has attained the national 1-hour ozone standard. Because of this finding, BAAQMD's previous planning commitments in the *2001 Ozone Attainment Plan* are no longer required. However, the finding of attainment does not mean the SFBAAB has been reclassified as an attainment area for the 1-hour standard. BAAQMD must submit a redesignation request to EPA to be reclassified as an attainment area. Therefore, the portion of the 2004 Ozone Strategy addressing national ozone planning requirements will include: (1) a redesignation request and (2) a maintenance plan to show the region will continue to meet the 1-hour ozone standard. Consequently, BAAQMD prepared the 2005 Bay Area Ozone Strategy, and is currently preparing the 2007 Strategy, which will address national and State air quality planning requirements. In addition, the CCAA requires BAAQMD to update the Clean Air Plan for attaining the State 1-hour ozone standard every 3 years (BAAQMD 2006).

TOXIC AIR CONTAMINANTS

TACs, or in federal parlance under the CAA, hazardous air pollutants (HAPs), are pollutants that result in an increase in mortality, a serious illness, or pose a present or potential hazard to human health. Health effects of TACs may include cancer, birth defects, and immune system and neurological damage.

TACs can be separated into carcinogens and noncarcinogens based on the nature of the physiological degradation associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which heath impacts will not occur. Noncarcinogenic TACs differ in that there is a safe level in which it is generally assumed that no negative health impacts would occur. These levels are determined on a pollutant-by-pollutant basis.

It is important to understand that TACs are not considered criteria air pollutants and thus are not specifically addressed through the setting of ambient air quality standards. Instead, the EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology (MACT and BACT) to limit emissions. These, in conjunction with additional rules set forth by BAAQMD, establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Program

Title III of the CAA requires the EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP may differ for major sources than for area sources of HAPs. (Major sources are defined as stationary sources with potential to emit more than 10 tons per year [TPY] of any HAP or more than 25 TPY of any combination of HAPs; all other sources are considered area sources.) The emissions standards are to be promulgated in two phases. In the first phase (1992–2000), the EPA developed technology-based emission standards designed to produce the maximum emission reduction achievable. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001–2008), the EPA is required to promulgate health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA required the EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, §219 required the use of reformulated gasoline in selected U.S. cities (those with the most severe ozone nonattainment conditions) to further reduce mobile-source emissions.

State and Local Toxic Air Contaminant Programs

California regulates TACs primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). The Tanner Act sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC. To date, ARB has identified over 21 TACs, and adopted the EPA's list of HAPs as TACs. Most recently, diesel exhaust particulate was added to the ARB list of TACs.

Once a TAC is identified, ARB's then adopts an Airborne Toxics Control Measure for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions. None of the TACs identified by ARB have a safe threshold.

The Hot Spots Act requires that existing facilities that emit toxic substances above specified level:

- Prepare a toxic emission inventory;
- Prepare a risk assessment if emissions are significant;
- Notify the public of significant risk levels;
- Prepare and implement risk reduction measure.

At the local level, air pollution control or management districts may adopt and enforce ARB's control measures. Under BAAQMD Rule 2-1 (General Permit Requirements) and Rule 2-2 (New Source Review), all sources that possess the potential to emit TACs are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. BAAQMD limits emissions and public exposure to TACs through a number of programs. BAAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors. In addition, BAAQMD has adopted Regulation 11 Rules 11 and 14, which address asbestos demolition renovation, manufacturing, and standards for asbestos containing serpentine.

ODORS

Typically odors are generally regarded as an annoyance rather than a health hazed. However, manifestations of a person's reaction to foul odors can range from the psychological (i.e. irritation, anger, anxiety) to the physiological, including circulatory and respiratory effects, nausea, vomiting, and headache.

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor and in fact an odor that is offensive to one person may be perfectly acceptable to another (i.e., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Neither the state nor the federal governments have adopted any rules or regulations for the control of odors sources. However, BAAQMD has adopted Rule 7 (Odorous Substances) that specifically addresses citizen complaints.

GREENHOUSE GAS EMISSIONS

Assembly Bill 32, the California Climate Solutions Act of 2006

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493[1] should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Marin County Greenhouse Gas Reduction Plan

Similarly to AB 32, Marin County has developed a countywide GHG emission reduction target of 15–20% below year 2000 levels by the year 2020 (Marin County 2006). This plan is a guidance document, adopted by the County Community Development Agency, for new development within Marin County; however, these goals are not binding. Marin County is one of only a handful of jurisdictions throughout California and the United States that has developed a local plan to address this important issue.

4.2.3 ENVIRONMENTAL IMPACTS OF THE PROJECT

THRESHOLDS OF SIGNIFICANCE

For the purpose of this analysis, the following applicable thresholds of significance, as identified by BAAQMD (BAAQMD 1999) or by the State CEQA Guidelines (Appendix G), have been used to determine whether implementing the proposed project would result in a significant air quality impact.

- **Short-Term Construction Impacts.** Construction impacts associated with the proposed project would be considered significant if the applicable control measures as listed in the BAAQMD CEQA Guidelines are not implemented.

- **Long-Term Regional (Operational) Impacts.** Regional impacts associated with the proposed project would be considered significant if implementation of the project results in emissions of ROG, NO_X, or PM_{10} that exceed 15 tons per year, or 80 pounds per day.

- **Local Mobile Source Carbon Monoxide Impacts.** Local impacts associated with the proposed project would be considered significant if the project results in or contributes to CO concentrations that exceed the California 1-hour ambient air quality standard of 20 ppm or the 8-hour standard of 9 ppm.

- **Toxic Air Contaminant Impacts.** Toxic air contaminant impacts associated with the proposed project would be considered significant if project construction or operation results in the exposure of sensitive receptors to toxic air contaminant emissions that exceed 10 in 1 million for the maximally exposed individual (MEI) to contact cancer and/or a Hazard Index of 1 for the MEI.

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[1] In 2002, then-Governor Gray Davis signed Assembly Bill (AB) 1493. AB 1493 requires that ARB develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by the ARB to be vehicles whose primary use is noncommercial personal transportation in the state."

- **Odor Impacts.** Odor impacts associated with the proposed project would be considered significant if project construction or operation results in the exposure of sensitive receptors to unpleasant odorous emissions.

No air district in California, including BAAQMD, has identified a significance threshold for analyzing GHG emissions generated by a proposed project or a methodology for analyzing air quality impacts related to global warming. Though, by adoption of AB 32, the state of California has identified GHG reduction goals, the effect of GHG emissions as they relate to global climate change is inherently a cumulative impact issue. In addition, Marin County has adopted a GHG Reduction Plan which aims to reduce countywide GHG emissions to 15-20% below year 2000 levels by the year 2020 (Marin County 2006). While the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change.

To meet AB 32 goals, California would need to generate less GHG than current levels. It is recognized, however, that for most projects there is no simple metric available to determine if a single project would substantially increase or decrease overall GHG emission levels.

While AB 32 focuses on stationary sources of GHG emissions, the primary objective of AB 32 is to reduce California's contribution to global warming by reducing California's total annual production of GHG emissions. The impact that GHG emissions have on global climate change is not dependent on whether they were generated by stationary, mobile, or area sources; or whether they were generated in one region or another. Thus, the net change in total GHG levels generated by a project or activity is the best metric for determining whether the proposed project would contribute to global warming. In the case of the proposed CHSC, if the size of the increase in emissions from the project is considered to be substantial, then the impact of the project would be cumulatively considerable.

GENERATION OF TEMPORARY EMISSIONS FROM CONSTRUCTION ACTIVITIES

Construction emissions are described as "short term" or temporary in duration and have the potential to represent a significant impact with respect to air quality, especially in the case of PM_{10}. Fugitive dust emissions are associated primarily with site preparation and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and VMT on- and off-site. ROG and NO_X emissions are associated primarily with the application of architectural coatings and construction equipment exhaust, respectively. On-site construction equipment may include but is not limited to the following: pile driver, excavator, backhoe, jack hammer, front-end loader, tractor, dump truck, truck, grader, crane, forklift, bobcat, air compressor, pneumatic lifts and tools, and other equipment.

With respect to the project, the construction of the proposed CHSC would temporarily generate emissions of ROG, NO_X, and PM_{10} from site grading and excavation, paving, demolition, motor vehicle exhaust associated with construction equipment, employee commute trips, and material transport (especially on unpaved surfaces), and other construction operations (Table 4.2-3).

BAAQMD emphasizes implementation of effective and comprehensive control measures rather than requiring a detailed quantification of construction emissions. BAAQMD requires that all feasible control measures, which are dependent on the size of the construction area and the nature of the construction operations involved, will be incorporated into the project design and implemented during all construction activities. Because the required control measures are not currently incorporated as an element of the project, the short-term construction emissions could result in or contribute to a violation of the air quality standards. As a result, this impact would be potentially significant (4.2-a).

Table 4.2-3 Summary of Modeled Maximum Daily Short-Term Construction-Generated Emissions			
Source	**ROG (lb/day)**	**NO_X (lb/day)**	**PM_{10} (lb/day)**
Demolition Phase (Fall 2007)			
Mobile Equipment Diesel Exhaust	13.26	117.10	4.33
Worker Commute	0.06	0.10	0.01
Fugitive Dust	–	–	18.17
Total Unmitigated Emissions (Site Preparation)[1]	13.32	117.20	22.51
Site Preparation Phase (Fall 2007)			
Mobile Equipment Diesel Exhaust	9.93	64.33	2.45
Worker Commute	0.04	0.02	0.01
Fugitive Dust	–	–	59.03
Total Unmitigated Emissions (Site Preparation)[1]	9.97	64.35	61.49
Building Construction Phase (Winter 2007–Fall 2009)			
Mobile Equipment Diesel Exhaust	20.31	126.23	4.33
Worker Commute	0.17	0.10	0.03
Architectural Coatings (Off-Gassing)	1.80	–	–
Asphalt (Off-Gassing)	0.02	–	–
Total Unmitigated Emissions (Building Construction)[1]	22.30	126.33	4.36

Notes:
ROG = reactive organic gases; NO_x = oxides of nitrogen; PM_{10} = particulate matter less than or equal to 10 microns in diameter; lb/day = pounds per day.
[1] Emissions modeled using the Urbemis2002 (v8.7) computer model, based on the proposed land uses, phasing information, and construction equipment as identified in the project description, and default model settings.
Refer to Appendix D for detailed assumptions and modeling output files.
Source: Data modeled by EDAW 2007.

GENERATION OF LONG-TERM REGIONAL (OPERATIONAL) EMISSIONS OF ROG, NO_X, AND PM_{10}

Regional area- and mobile-source emissions of ROG, NO_X, and PM_{10} (which includes $PM_{2.5}$) associated with the implementation of the project were estimated using URBEMIS 2002 Version 8.7.0 computer program, which is designed to model emissions for land use development projects. URBEMIS allows land use selections that include project location specifics and trip generation rates along with double-counting and pass-by trip options. URBEMIS accounts for area-source emissions from the usage of natural gas, wood stoves, fireplaces, landscape maintenance equipment, and consumer products; and mobile sources emissions because of generation of vehicle trips.

Regional area and mobile source emissions were estimated based on trip generation rates presented in the transportation analysis (DKS 2007) and default model settings for conditions in the SFBAAB. Based on the modeling conducted, the operation of the proposed project would result in unmitigated long-term regional emissions of approximately 2 lb/day of ROG, 2 lb/day of NO_X, and 2 lb/day of PM_{10}, as summarized in Table 4.2-4. The long-term regional emissions would be primarily associated with mobile sources because of additional employee trips rather than area sources, which consist of landscape maintenance emissions. The proposed project would also result in emissions of CO. However, because CO disperses rapidly with increased distance from the source, emissions of CO are considered localized pollutants of concern rather than of regional concern. Refer to the analysis of local CO emissions.

Table 4.2-4 Summary Long-Term Regional Emissions			
	ROG (lb/day)	NO_X (lb/day)	PM_{10} (lb/day)
PROPOSED PROJECT[1]			
Area Source	0.28	0.99	–
Mobile Vehicle Source	1.22	1.20	1.57
Total Unmitigated	1.50	2.19	1.57
BAAQMD Threshold Significance	80	80	80

Notes:
ROG = reactive organic gases; NO_x = oxides of nitrogen; PM_{10} = particulate matter less than or equal to 10 microns in diameter; lb/day = pounds per day; BAAQMD = Bay Area Air Quality Management District.
[1] Modeling based on trip generation information as presented in the traffic analysis prepared for this project (DKS 2007) and default model conditions for the SFBAAB. See modeling results in Appendix D for further detail.
Source: Data compiled by EDAW in 2007.

Daily emissions of ROG, NO_X, and PM_{10} would not exceed BAAQMD's significance threshold, and therefore would not result in or substantially contribute to a violation of the air quality standards or conflict with applicable standards and plans. As a result, this impact would be considered less than significant (4.2-b).

GENERATION OF LOCAL MOBILE-SOURCE CARBON MONOXIDE EMISSIONS

CO concentration is a direct function of vehicle idling time and, thus, traffic flow conditions. Under specific meteorological conditions, CO concentrations near congested roadways and/or intersections may reach unhealthy levels with respect to local sensitive land-uses such as residential areas, schools, and hospitals. As a result, BAAQMD recommends analysis of CO emissions at a local rather than a regional level.

The Transportation Project-Level Carbon Monoxide Protocol (Garza et al. 1997) states that signalized intersections at level of service (LOS) E or F represent a potential for a CO violation, also known as a "hot spot." Thus, modeling of CO concentrations is typically recommended for receptors located near signalized roadway intersections that are projected to operate at a LOS E or F.

According to the traffic analysis prepared for the project, signalized intersections in the vicinity of the project site would be anticipated to operate at acceptable LOS with implementation of the proposed project (DKS 2007), or would not be deteriorated from acceptable LOS to unacceptable LOS under plus project conditions (DKS 2007). Thus, implementation of the project would not be anticipated to result in or contribute to local CO concentrations that exceed the California 1- or 8-hour ambient air quality standards of 20 parts per million (ppm) and 9 ppm, respectively. As a result, this impact would be less than significant (4.2-c).

EXPOSURE OF SENSITIVE RECEPTORS TO TOXIC AIR EMISSIONS

The exposure of sensitive receptors to toxic air emissions from short-term construction equipment, existing stationary sources, and proposed stationary sources are discussed separately below.

Short-term Construction Mobile Sources

Construction of the project would result in diesel exhaust emissions from on-site heavy duty equipment. As previously discussed, particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a toxic air contaminant by the ARB in 1998. Construction-related diesel PM emissions would occur from the use of off-road diesel equipment required for site grading and excavation, paving, and other construction activities. BAAQMD has not adopted any methodologies for assessing short-term construction-generated TAC emissions (e.g., diesel PM). As a result, BAAQMD does not recommend the quantitative assessment of TAC emissions related to construction. Although mobile diesel equipment would only be present on-site temporarily during construction activities, it is uncertain whether emissions of diesel PM from construction projects would result in the exposure of sensitive receptors (i.e., prison employees, inmates, and residences of San Quentin Village) to levels that exceed BAAQMD standards. Therefore, construction activities associated with the project could potentially result in the generation of diesel PM emissions that exceed BAAQMD thresholds of significance (exposure of sensitive receptors to toxic air contaminant emissions that exceed 10 in 1 million for the MEI to contact cancer and/or a Hazard Index of 1 for the MEI.)

Short-term Construction Demolition

Building 22 was originally constructed during 1854 and additions were built over a 78-year period following that time. Portions of the building contain lead-based paint and asbestos. A hazardous materials survey has been performed for the proposed project to identify asbestos and lead-based paint materials in Building 22. All materials would be appropriately handled and removed prior to demolition of Building 22 in accordance with all federal and state agency requirements. These requirements would ensure that no construction employees, prisoners, prison staff, or surrounding off-site receptors would be exposed to these hazardous materials, and these materials would not become airborne.

Stationary Sources

Implementation of the project would not include the installation of a medical waste incinerator, but may include chemical hoods associated with the medical care facility. This type of source is considered a major source of TACs and would be subject to BAAQDM's permitting process for stationary sources subject to installation of Best Available Control Technology for TACs (T-BACT). Under BAAQMD 2-1 (General Permit Requirements), all sources that possess the potential to emit TACs are required to obtain permits from BAAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including Rule 2-2 (New Source Review), which would ensure that all applicable emissions control mechanisms would be implemented, offset requirements would be met, and all toxic air emissions associated with the new source would be within acceptable limits.

Given that compliance with applicable standards are required for the construction and operation of land uses that may result in the emissions of TACs, the TAC emissions from the routine use of facilities in operations, both on and off the project site, are expected to be within established standards. As a result, stationary sources of toxic air emissions would be less than significant. However, the level of exposure of sensitive receptors to short-term construction-generated emissions of diesel PM is uncertain. Therefore, the short-term impact of TAC emissions associated with construction of the proposed project is potentially significant. (4.2-d).

EXPOSURE OF SENSITIVE RECEPTORS TO ODOROUS EMISSIONS

The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

The project would not include the long-term operation of an odorous emission source; however, construction of the project would result in diesel exhaust emissions from on-site diesel equipment. Such emissions would be quite intermittent in nature and would dissipate rapidly from the source. In addition, mobile diesel equipment would only be present on-site temporarily during construction operations. Thus, the construction of the project is not anticipated to result in the exposure of sensitive receptors (i.e., prison employee residences or inmates) to an objectionable odor source. As a result, this impact would be less than significant (4.2-e).

4.2.4 PROPOSED MITIGATION MEASURES

LESS-THAN-SIGNIFICANT IMPACTS

The following impacts were identified as less than significant, and therefore no mitigation is required:

4.2-b: Generation of Long-Term Regional (Operational) Emissions of ROG, NO_X, and PM_{10}
4.2-c: Generation of Local Mobile-Source CO Emissions
4.2-e: Exposure of Sensitive Receptors to Odorous Emissions

SIGNIFICANT IMPACTS THAT CAN BE MITIGATED TO A LESS-THAN-SIGNIFICANT LEVEL

The following impacts were identified as significant. Mitigation to reduce these impact to a less-than-significant level is recommended below.

4.2-a: Generation of Temporary Emissions from Construction Activities

In accordance with BAAQMD CEQA Guidelines (BAAQMD 1999), the following mitigation, which includes BAAQMD-recommended basic, enhanced, and optional control measures, will be implemented to reduce construction generated emissions to a less-than-significant level.

Implement the following measures to control emissions of fugitive dust:

- Water all active construction areas at least twice daily or as often as needed to control dust.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily or as often as needed to control dust, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (nontoxic) soil stabilizers or water to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water as needed, or apply (nontoxic) soil binders to exposed stockpiles (dirt, sand, etc.) as needed to control dust.
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways and to the bay.
- Replant vegetation in disturbed areas as quickly as possible (if applicable).
- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph and dust is created.
- Limit the area subject to excavation, grading and other construction activity at any one time.

Implement the following measures to control emissions of ozone precursors from mobile exhaust:

- Use alternative fueled construction equipment.
- Minimize unnecessary idling time (e.g., 5 minutes maximum when not engaged in work activities, including on-road haul trucks while being loaded or unloaded on-site.).

In addition to the measures identified below, construction activities are also required to comply with all applicable BAAQMD rules and regulations, specifically Rule 8-3 regarding architectural coatings, Rule 8-15 regarding asphalt paving, Rule 11-2 regarding demolition, and Regulation 6 regarding particulate matter and visible emissions.

- Pursuant to BAAQMD Rule 6, CDCR will ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40% opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40% opacity (or Ringelmann 2.0) will be repaired immediately, and the construction contractor and BAAQMD will be notified within 48 hours of identification of noncompliant equipment. A visual survey of all in-operation equipment will be made at least weekly, and a monthly summary of the visual survey results will be submitted throughout the duration of the project, except that the monthly summary will not be required for any 30-day period in which no construction activity occurs. The monthly summary will include the quantity and type of vehicles surveyed as well as the dates of each survey. BAAQMD and/or other officials may conduct periodic site inspections to determine compliance.
- Maintain properly tuned equipment. The construction contractor will provide a plan for approval by BAAQMD demonstrating that the heavy-duty (more than 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, would achieve a projectwide fleet average 45% particulate reduction compared to the most recent ARB fleet average. Acceptable options for reducing emissions may include use of late-model engines, low-emission diesel products, alternative fuels (e.g., Lubrizol, PuriNOx, biodiesel fuel), engine retrofit technology, after-treatment products, and/or other options as they become available.

According to the BAAQMD CEQA Guidelines (BAAQMD 1999), implementation of the above mitigation measures would reduce air pollutant emissions from construction activities to a less-than-significant level.

4.2-d: Exposure of Sensitive Receptors to Toxic Air Emissions

Implementation of the above-recommended mitigation measures (under Mitigation Measure 4.2a), to minimize emissions of ozone precursors from mobile exhaust during construction, would also act to reduce TAC emissions associated with mobile exhaust during construction to the extent that impacts from TAC would no longer be significant. In addition to the measures listed above, CDCR will implement the following measure:

- Staging areas and equipment maintenance activities will be located as far from sensitive receptors as feasible.

Successful implementation of these measures would be expected to reduce emissions of diesel PM by approximately 95% (Vintz, pers. comm., 2006). The proposed measures, taken with the temporary nature of the on-site construction activities, highly dispersive properties of diesel PM, and the fact that dispersion would be further enhanced due to wind currents from the San Francisco Bay, would substantially reduce concentrations of diesel PM. Thus, this impact would be reduced to less than significant.